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The book by PEABODY and HUNT<sup>3</sup> is principally interesting as illustrating a very distinct recent tendency in elementary botanical instruction. It will be recalled that not long since our elementary texts emphasized morphology and anatomy. Of late the new books have been giving more and more space to the physiology and ecology of seed plants. The book under review carries this to the extreme by relegating the morphology to a final "optional" chapter. Such an extreme position will scarcely be accepted generally, but the tendency in that direction is unmistakable.

The tendency toward the abbreviation of the morphological part of the work is evident also in *Experimental botany*.<sup>4</sup> The last chapter in the book takes up the "cryptogams." This book is a laboratory manual rather than a textbook, though there is a small amount of descriptive text. Its unique feature is in the experimental attitude which is maintained throughout. The author feels that botany should be taught experimentally in the same sense that physics or chemistry is so taught; the selection of physiological materials follows naturally. The laboratory directions appear to be workable. A large number of the experiments are new to elementary texts. The new point of view and the new experiments make it a stimulating book for teachers.

The laboratory manual by FRYE and RIGG<sup>5</sup> is intended to meet the needs of teachers on the Pacific slope. The species suggested for laboratory work are selected with reference to the western flora. The directions for work are well written, and it is in every way an excellent little book. While it is written with western conditions in mind, and must be particularly welcome in that part of the country, it would be quite usable in the East as well.—W. L. EIKENBERRY.

#### MINOR NOTICES

**Flora of Porto Rico.**—The publication of the fourth fascicle of Vol. IV of URBAN'S *Symbolae Antillanae*,<sup>6</sup> which includes the sympetalous groups from the genus *Tamonea* of the Verbenaceae to the end of the Compositae, under the subsidiary title of *Flora portoricensis*, brings to a close a consideration of one of the most interesting of our insular floras. New species are described in *Priva*, *Dicliptera*, and *Psychotria*. The taxonomic part is followed by a *Nachwort*, in which the author sets forth the purpose of the work and reviews

<sup>3</sup> PEABODY, J. E., and HUNT, A. E., *Elementary plant biology*. 8vo. pp. xvi+207. figs. 91. New York: Macmillan. 1912.

<sup>4</sup> PAYNE, F. O., *Manual of experimental botany*. 8vo. pp. 272. figs. 117. New York, Cincinnati, Chicago: American Book Co. 1912.

<sup>5</sup> FRYE, T. C., and RIGG, G. B., *Laboratory exercises in elementary botany*. 8vo. pp. xxii+139. Boston: Ginn & Co. 1911.

<sup>6</sup> URBAN, IGNATIUS, *Symbolae Antillanae seu fundamenta florum Indiae Occidentalis*, Vol. IV, fasc. 4. pp. 529-771. *Flora portoricensis*. Leipzig: Fratres Borntraeger. 1911.

briefly the circumstances under which the study was begun, developed, and brought to completion. A brief but interesting chapter is devoted to a history of botanical exploration in Porto Rico from the earliest collections made in 1785-1786 to the recent expeditions by different members of the staff of the New York Botanical Garden. A careful tabulation shows that 2056 species, representing 167 families of Pteridophytes and Phanerogams, are known from the island at the present time. Of this number 271 species, or 13.13 per cent, are peculiar to the island. The families best represented in numbers of species are: Polypodiaceae (182), Leguminosae (136), Gramineae (122), Compositae (90), Orchidaceae (86), and Cyperaceae (85). From a detailed analysis of the species recorded, Professor URBAN concludes that the flora of Porto Rico is most closely allied to that of South America. A very complete index to the Latin and vernacular names terminates the volume. The work forms a reliable and authoritative basis for future investigations on the flora of this interesting and economically important insular territory.—J. M. GREENMAN.

**Flora of Formosa.**—Since the publication of the *Enumeratio plantarum Formosanarum* in 1906 and the *Flora montana Formosae* in 1908, investigations on the flora of the island of Formosa have been pushed forward with astonishing vigor, which is amply attested to by the appearance of another volume entitled *Materials for a flora of Formosa*.<sup>7</sup> The author in the present volume has attempted to enumerate all species recorded from the island since the publication of the works mentioned above. Flowering plants, ferns, and fern-allies only are included, and these are chiefly from the mountainous regions of the island. Over 700 species are listed, representing 343 genera and 109 families, thus making the total number of species known up to the present time 2660, representing 836 genera and 156 families. The work of identification of the plants on which this contribution to knowledge is based has been carried on at Tokyo, Kew, Paris, Berlin, and St. Petersburg, and over 300 species and several varieties are characterized as new to science. The location of the island of Formosa is such that its flora is composed of elements common to Japan, China, India, and the Malayan region. The large number of novelties recorded is suggestive of a very rich and varied flora, and indicates, moreover, that Formosa is still a fruitful field for further taxonomic investigation.—J. M. GREENMAN.

#### NOTES FOR STUDENTS

**Biology of rusts.**—MÜHLETHALER, who has made a large number of cultural experiments with the crown rusts of grasses in Switzerland, has given a complete account of his investigations, a part of the results of which have already been published in a preliminary account.<sup>8</sup> Since DEBARY's demon-

<sup>7</sup> HAYATA, B., *Materials for a flora of Formosa*. Jour. Sci. Coll. Tokyo 30:1-471. 1911.

<sup>8</sup> Rev. Bot. Gaz. 51:157. 1911.